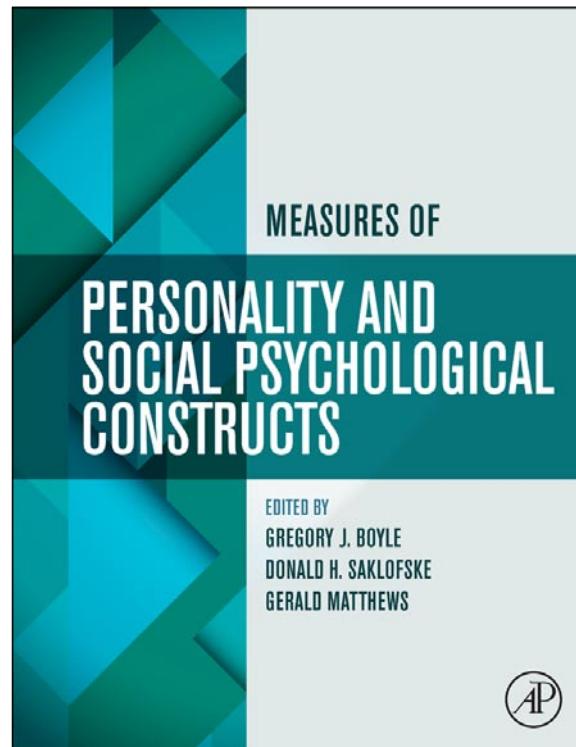


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Measures of Sensation Seeking

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The sensation seeking construct is defined as: 'A trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience' (Zuckerman, 1994, p. 27). Some have equated sensation seeking with 'risk seeking'. However the definition above stresses the 'willingness' to take risks for the rewards of the primary qualities of valued stimulation such as novelty and intensity. Others have equated the trait with 'thrill seeking'. Thrill seeking is identified with one type of sensation seeking involving activities with a primary physical risk, as in the thrill and adventure seeking subscale of the Sensation Seeking Scale (SSS) (described in Zuckerman, 1994). Not all types of sensation seeking involve risk. Entertainment preferences, for instance, may involve arousal through sensory or vicarious experience but there is no perceived risk (Zuckerman, 1996, 2006a, 2006b). Measures of sensation seeking exhibit validity in a wide range of contexts, far beyond the initial use as a method devised to predict the outcomes of sensory deprivation experiments. Some changes in the original theory of optimal levels of stimulus intensity were needed to include individual differences in preferences for novelty and change (Zuckerman et al., 1993b).

Volunteers for sensory deprivation experiments tend to be drawn from the high sensation seeking range of the General scale of the SSS. Post-experimental interviews revealed that they volunteer because they hope to have some unusual experiences suggested by the media, like hallucinations and 'out-of-body' experiences. Sensation seeking is more involved with seeking of novel internal or external sensory or fantasy experiences than with mundane cognitive or social experiences. Low sensation seekers tend to regard such experiences as risky and tend not to volunteer even despite financial incentives. Sensation seeking, as measured by the SSS-II General scale, was related to volunteering for sensory deprivation, drug, and hypnosis experiments but not for experiments in learning or social psychology (Zuckerman, 1994).

Soldiers who volunteered for certain types of risky behavior in the American or Israeli army and Israel security forces were found to be high sensation seekers (Zuckerman, 1994). Israeli psychologists found that those decorated for bravery in combat during the Yom Kippur war scored higher on the SSS than other soldiers who fought in the war but won no decorations (Neria, Solomon, Ginsberg, & Dekel, 2000).

Police are not higher in sensation seeking than the general population (Goma-i-Freixanet & Wismeijer, 2002; Homant, Kennedy, & Howton, 1994), but patrol officers who engage in high-speed car chases do score higher on measures of sensation seeking (Homant et al., 1994). Sensation seeking is not a universal motive in all those who engage in such activities, but it is a strong trait in those who voluntarily take extra risks. This confirms the part of the SS definition, '*... the willingness to take risks ... for the sake of such experience.*'

If we array various sports by their mean scores on the Total score of the SSS-V (see Table 3-1, p. 394, Zuckerman, 2007), the highest scoring group is expedition mountain climbers who attempt to climb the highest mountains like Mt. Everest. Next highest are groups of skydivers, elite mountain climbers and white-water canoeists all of whom score higher than the norm, not only on the Total SSS, but also on Thrill and Adventure Seeking (TAS) and Experience Seeking (ES) subscales. Karate fighters, physical education students, ice-hockey players, male teachers, and tennis players, tend to score in the middle range on norms based on university students.

The mean scores of volley-ball players and female teachers tend to be low. [Jack and Ronan \(1998\)](#) also found that skydivers and mountain climbers as well as hang-gliders tend to score highly on the SSS-V Total, whereas the scores of swimmers and auto-racers were average, while golfers and marathon runners scored lower. [O'Sullivan, Zuckerman, and Kraft \(1998\)](#) compared male football and baseball team players and female equestrians, field hockey and lacrosse team students with unselected undergraduates using the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ) Impulsive Unsocialized Sensation Seeking Scale (ImpSS). None of the female teams differed from the undergraduate controls or among themselves on the ImpSS. The male baseball and football teams actually scored lower on the ImpSS than the general male undergraduates.

If risky sports are more attractive to high sensation seekers, why are auto racers not high in sensation seeking? And why are non-risky sports like pool, target shooting and modern dancing associated with high sensation seeking? Chess is a game (or sport) associated with cerebral competition, but surprisingly, players of the game score more highly than non-players on the SSS Total, and more experienced players score even more highly ([Joireman, Fick, & Anderson, 2002](#)). Novelty and intensity of the activity, whether physical or cerebral, are important but not the whole story.

Driving for high sensation seekers is a chance to express their need for thrills and excitement at the risk of physical or legal harm. Risky driving is shown in inappropriate speeding, following too closely at high speeds ('tail-gating'), driving while intoxicated (DWI), frequent and abrupt lane changes, and aggressive, inconsiderate driving in general. From a review of 40 studies of sensation seeking and risky driving, [Jonah \(1997\)](#) reported positive correlations between sensation seeking and risky driving. Correlations were higher among men and in studies where the full SSS was administered. In another study, high sensation seekers were found to drive faster than low sensation seekers ([Heino, 1996](#)). Highs and lows did not differ in their perceptions of risk but high sensation seekers were more willing to accept risk. High sensation seekers followed the car ahead of them at a closer distance (tailgating) than did the low sensation seekers. High sensation seekers did not perceive their following distances as risky. [Burns and Wilde \(1995\)](#) also reported that sensation seeking correlated directly with observed fast and reckless driving and with records of past violations. These and other behavioral studies confirm that risk judgments of sensation seekers are biased toward the low end enabling them to take greater risks than more risk-averse low sensation seekers ([Rosenbloom & Wolf, 2002](#)).

Studies of university students showed that experience in heterosexual activities and number of partners was positively associated with SSS General scores on the SSS-IV ([Hoyle, Fejfar, & Miller, 2000; Zuckerman, 1994](#)). Some items, particularly in the Disinhibition subscale (Dis), were confounded with sexual content (attitudes not experience), but for males, sexual activities and partners correlated with all of the subscales not just the Dis scale. Homosexual risky activities in gay men showed similar positive correlations with sensation seeking ([Kalichman et al., 1994](#)). [Hoyle et al. \(2000\)](#) reported that sexual risk taking was defined by number of partners, unprotected sex, and high-risk sexual encounters such as sex with a stranger. Sensation seeking was related to all three categories. Correlations with the SSS were higher than those for nearly all other personality traits. [Cohen and Fromme \(2002\)](#) found that the ZKPQ ImpSS predicted risky sex behavior in a university sample at two points in time one year apart. ImpSS predicted risky sex behavior through its effects on outcome expectancies, particularly positive ones.

Beginning in the mid-1990s there has been increasing study of sensation seeking and sex in gay populations. The AIDS epidemic and the high risk status of Men Who Have Sex with Men (MSM) increased the urgency of this research. [Kalichman et al. \(1994\)](#) devised two types of sensation seeking scales for MSM related research. The Sexual Sensation Seeking Scale (SSSS) items pertain to seeking sensation through sex but the items are not specific to sexual orientation. The Nonsexual Experience Seeking Scale (NSES) is a general sensation or experience seeking scale with no reference to sex in the items. A series of studies of MSMs using both scales and the SSS were carried out by [Kalichman et al. \(1994\)](#) – (see [Zuckerman, 2007](#), Table 5.2, p. 161). Three high risk behaviors were predicted: many sexual partners, anal sex without condoms, and use of alcohol and drugs just prior to or during sex. [Kalichman et al. \(1994\)](#) found that both the SSSS and the NSES correlated positively with the three risk factors. In the largest study, using 509 gay men, those having multiple sexual partners and anal sex without condoms scored more highly on the Dis and BS subscales of the SSS-V than did less risk-taking MSMs ([Bancroft et al. 2003](#)). Another study, using the SSS-IV, found that the General scale correlated with all high risk behaviors ([Dolezal, Meyer-Bahlburg-Heino, Remien, & Petkova, 1997](#)), whereas [Schroth \(1996\)](#) found that only the number of sexual partners was related to the SSS-V Total score.

[Zuckerman and Kuhlman \(2000\)](#) conducted a study of risky behaviors among college students using the ZKPQ. The first question asked about different types of risky behavior, i.e. Is there a general risk-taker? Smoking,

drinking, drug taking, and sex were all intercorrelated forming a central risk taking factor. Driving and gambling were more peripheral to the central factor related to drinking. The connection between sex and drinking and drugs may be the sensation seeking traits of disinhibition and impulsivity. The ImpSS scale correlated significantly with drinking, smoking, drugs, and sex, but not with driving or gambling. High risk takers on a composite risk index scored more highly than low risk takers on ImpSS as well as Sociability (Sy) and Aggressiveness–Hostility (Agg-Host).

Substance use and abuse has been associated with sensation seeking (see Zuckerman, 1994, 2007). In the first studies on college students (Zuckerman, 1994), about two-thirds of high sensation seekers (as measured on the SSS-IV) had used drugs compared with less than a third of low sensation seekers. Twenty years later, the results were nearly the same (Kumar, Pekala, & Cummings, 1993). Based on the Optimal Level of Arousal (OLA) theory, we expected higher sensation seeking with use of stimulant drugs like cocaine rather than suppressant drugs like heroin. However sensation seeking was more highly related to the number of drugs used rather than type of drug. University students and naval personnel who used illegal drugs, including marijuana, were higher on sensation seeking than abstainers from alcohol or drugs and users of alcohol. High sensation seeking college students in the past had experimented with LSD and other hallucinogens. More recently, sensation seekers have discovered 3,4-methylenedioxy-*N*-methylamphetamine (MDMA; Ecstasy), an amphetamine analogue with psychedelic effects and enhanced energy. It is commonly used at dance parties or 'raves'. MDMA users scored more highly on the Experience Seeking subscale of the SSS than either marijuana only users or non-drug users (Daumann, Pelz, Becker, Tuchtenhagen, & Gonzoulis-Mayfrank, 2001) and on the ImpSS scale of the ZKPQ (Benschop, Rabes, & Korf, 2003). SS scales predict future smoking, drinking, and drug use among adolescents (see Table 4.1, p. 113 in Zuckerman, 2007). For example, Ames, Sussman, and Dent (1999) used the 11-item sensation seeking part of the ZKPQ ImpSS scale to predict drug use in over 1000 high-school students at baseline and after a one-year follow-up. Sensation seeking predicted drug use even when controlling for beliefs or attitudes. The ImpSS contains no potentially confounding content itself.

Firefighters have a generally boring occupation punctuated by periods of high excitement when they actually rush off to fight fires. It is a risky occupation. Not surprisingly, they score highly on the SSS-V Total and ES and Dis subscales (Goma-i-Freixanet, Perez, & Torrubia, 1988). Police and soldiers as groups are not high sensation seekers, although those who volunteer for risky assignments or engage in risky behaviors do tend to be high sensation seekers. Less obvious occupations chosen by high sensation seekers are air-traffic controllers, medical personnel choosing to work in emergency room settings, and rape crisis counselors (Zuckerman, 1994). These work settings involve highly stressful situations in which the physical risk is not that of the employees, but that of air passengers or patients. High sensation seekers seem to enjoy stressful environments, but may suffer from boredom when the settings are quiet.

Areas of behavior described above in relation to sensation seeking have often involved risk. However the preferences of sensation seekers in entertainment involve little or no risk but merely reflect their reward values in stimulation: novelty, intensity, and complexity (Zuckerman, 2006a, 2006b). Complexity is a stimulus attribute preferred by high sensation seekers. This is seen in their preferences among simple designs (Zuckerman, 1994). High sensation seekers prefer designs that are complex and asymmetrical, whereas low sensation seekers prefer designs that are simple and symmetrical. The arousal potential of movies affects their attraction for high sensation seekers and avoidance for low sensation seekers; highs like horror and sexually explicit films and fast-moving action films (Zuckerman, 1994). Given a choice, high sensation seekers prefer action movies, with high correlations between number of channel switches and SSS scores. *Channel surfing* reflects sensation seekers' need for change and novelty and their boredom susceptibility (Perse, 1996).

Preferences in music seem to reflect the intensity dimension. High sensation seekers among college students like all types of rock music, but particularly 'hard rock' or 'heavy metal' types (Stratton & Zalanowski, 1997; Zuckerman, 1994). Low sensation seekers prefer bland movie-track type music. However among the older faculty, the correlation between listening time to rock and sensation seeking was in the opposite direction reflecting a reduction in sensation seeking into middle and old age. Rawlings, Barrantes, Vidal, and Furnham (2000) found a common factor in preferences for violent-abstract painting and hard rock music at one pole, and dislike or low liking for emotionally neutral-realistic paintings and easy-listening type music at the other. Sensation seeking, particularly the Dis subscale, correlated positively with liking of rock music and emotional-abstract art, and low liking for neutral-realistic paintings and easy-listening music. The distinctive preferences involved both emotional content and style. A liking for violent and erotic content in photographs and paintings (Rawlings, 2003) was found in high sensation seekers in comparison with low sensation seekers who prefer pleasant paintings of

low emotional intensity. Zuckerman et al. (1993) related stylistic preferences among 19th century paintings to sensation seeking. Expressionistic art, involving intense color and emotional content (e.g., Van Gogh), was liked relatively more by high sensation seekers as measured by the SSS-V. [Furnham and Walker \(2001\)](#), using the SSS VI, found a preference for Pop art among high sensation seekers, and [Furnham and Avison \(1997\)](#) found that high sensation seekers also liked surreal art. Both pop and surreal art use familiar objects and images of people in novel contexts. The preferences of sensation seekers in media, music, and art reflect an appetite for both novelty and intensity in style and violence and eroticism in content. In general, there is a preference for style and content that is arousing whether in realistic photographic or abstract and novel styles, or some combination of the two. In music, intensity creates a liking for hard edge rock music although this depends on generational differences in exposure.

Behavioral differences between high and low scorers on the SSS scales also depend on genetic, physiological, biochemical, and neurological differences. A biosocial theory of sensation seeking has been developed as part of the trait construct. The reader is referred to previous publications on the biological bases of sensation seeking [Zuckerman \(2005, 2007, 2008a, 2008b, 2011\)](#). Behavior genetic studies using the SSS-V and twins (both separated and raised together), have shown a high degree of heritability for the Total Score and its subscales ([Zuckerman, 1994, 2002b](#)). Molecular genetic studies have shown an association between novelty seeking and the dopamine receptor 4 gene (DRD4). The monoamine theory of sensation seeking involves three monoamines: dopamine, serotonin and norepinephrine ([Zuckerman, 1995](#)). Dopamine in the medial forebrain bundle and the nucleus accumbens mediates the approach to novel and arousing stimuli; serotonin reactivity regulates the strength of inhibition; and norepinephrine mediates general arousal. Sensation seeking is based on strong dopaminergic reactivity to novel and intense stimuli, weak serotonergic reactivity, and accounting for the connection between sensation seeking and impulsivity, and low fear arousability in relation to weak noradrenergic reactivity. This model bases the trait of sensation seeking on an interaction between these neurotransmitter systems. As for evidence for individual differences in brain function, there are two such models for sensation seeking: [Dellu, Piazza, Mayo, LeMoal, and Simon \(1996\)](#) employed a model using rats which were highly reactive (exploratory) to novel environments, whereas [Saxton, Siegel, and Lukas \(1987\)](#) used a psychophysiological marker, related to sensation seeking in humans, to distinguish high and low sensation seeking cats. Research using functional magnetic resonance imaging (fMRI) in humans is moving brain studies into sensation seeking from lower animals back to humans. Psychophysiological studies of humans ([Zuckerman, 1990](#)) have shown a heightened sensitivity of sensation seekers in their arousal to novel stimuli. Studies using the evoked potential have shown high cortical arousability and tolerance for high intensity stimuli (augmenting) in high sensation seekers, whereas low sensation seekers show a cortical inhibitory response (reducing).

The first SSS was developed during the author's research program into sensory deprivation (see [Zuckerman, 1994](#)) involving the idea of individual differences in an *Optimal Level of Stimulation* (OLS) and an *Optimal Level of Arousal* (OLA). The OLS theory postulated that intensity of sensation varies directly with intensity of stimulation, but affective response varies in a curvilinear fashion: the pleasurable quality of sensation increases with intensity up to some optimal level after which it decreases with further stimulation and soon becomes aversive. According to OLS theory, a sensory deprivation situation would be particularly aversive for high sensation seekers. Hebb transformed OLS theory to an OLA one maintaining that the curvilinear relationship between affective response and efficiency of learning and performance was related to level of central brain arousal: individuals feel and function best at intermediate levels of arousal. At very low levels they are not alert, or interested and do not feel positive emotions; at very high levels there is increasing negative emotion like anxiety. Hebb localized the OLA in the ascending *Reticular Activating System* (RAS) and suggested that the cortex has a feedback function that in response to over-arousal can deactivate or inhibit the sensory sources of arousal through the descending RAS. After the initial positive reaction to the novelty of the sensory deprivation situation, the effect of drastic stimulus reduction decreases arousal of the cortical nervous system as measured by electroencephalography (EEG). The major stress in long-term sensory deprivation is due to lowered arousal, which in the waking condition is experienced as boredom. However the introduction of even meaningless novel and changing stimuli can temporarily alleviate the stress (see revision in [Zuckerman, 1994](#)). The problem with the initial construct was the absence of a role for novelty beyond intensity of stimulation. Novelty has some arousal function, but it is difficult to conceive of an '*optimal level of novelty*'. In writing items for the first experimental form of the SSS, the emphasis was on intensity of sensation rather than need for novel stimulation. It was expected that factors might be in the form of sensory sources of stimulation like visual, auditory, gustatory, tactual, and olfactory. However, many of the general factor items emphasized novelty.

MEASURES REVIEWED HERE

1. Sensation-Seeking Scale (Form V) (Zuckerman, 1994)
2. Sensation-Seeking Scale (Form VI) (Zuckerman, 1994)
3. Impulsive Sensation Seeking Scale from ZKPQ (Zuckerman et al., 1993)
4. Impulsive Sensation Seeking Scale from ZKPQ 69-item Short Form (Aluja, García, & García, 2003)
5. ImpSS Scale from Cross-Cultural Shortened Form of the ZKPQ (Aluja et al., 2006)
6. Zuckerman–Kuhlman–Aluja Personality Questionnaire (Aluja et al., 2010b)

Other Sensation Seeking Scales

1. Novelty Seeking Scale (Cloninger, Svrakic, Bayón, & Przybeck, 1999)
2. Arnett Inventory of Sensation Seeking (Arnett, 1994)
3. Brief Sensation Seeking Scale (Hoyle, Stephenson, Palgreen, Lorch, & Donohew, 2002)

OVERVIEW OF THE MEASURES

The first SSS used a forced-choice response format because of a concern about the influence of social desirability, a response set of great concern at that time. Every item contained an A or B version, one representing a high sensation seeking and the other a low sensation seeking choice. An attempt was made to word the items so that the two choices seemed equally desirable or undesirable. The resulting scales did not correlate with social desirability. Although this response form may have been unnecessary it did not seem to pose any problems for respondents and was retained in subsequent Forms II through to Form V.

In accord with the initial focus on intensity of stimulation, 14 of the 54 items in Form I described a liking for extremes of stimulation in various sensory modalities. Sixteen of the items described a desire to engage in exciting or risky sports or activities or an adventurous as opposed to a secure life. Eight items described a liking for novel as opposed to familiar stimuli, situations, or persons.

A General SS was constructed from the 22 items loading most highly on the unrotated first factor in both men and women (Zuckerman, 1994). Most of the items describing a preference or aversion to stimulus intensities of simple sensory stimuli did not load on the general factor. Many of those pertaining to physical risk taking did load on that factor and experience seeking items also did so.

The analysis of Forms I and II suggested that there might be subtraits or facets of the General factor that were not expressed because of the paucity of items representing them. Exciting but risky sports and novelty seeking were examples. In order to define these factors new items were written for the experimental SSS Form III. Form III consisted of the 50 items from Form I plus 63 new items for a total of 113 items. The General scale in Form II was replicated in analysis of the first unrotated factor, but both orthogonal and oblique rotations yielded four factors that were similar in both men and women (Zuckerman, 1994). These factors are described in terms of their content:

Thrill and Adventure Seeking (TAS)

The items express a desire to engage in extreme sports that provide unusual and intense experiences, like sky-diving, or more common sports that can provide intense sensations in their expression through speed and extreme risk, like driving fast or skiing down extreme slopes. Most items are not phrased in terms of actual experience but in terms of desired experience.

Experience Seeking (ES)

The items describe seeking novel experiences through the mind and the senses as in music, art, travel, social nonconformity and association with like-minded individuals and groups.

Disinhibition (Dis)

The items describe a desire to engage in disinhibited social behavior as facilitated by alcohol in parties and impulsive sexual activities. A general item sums up the disinhibited attitude: *'I like to have new and exciting experiences even if they are a little unconventional or illegal'*. This factor drew largely on new items not present in earlier forms of the SSS (I and II).

Boredom Susceptibility (BS)

The items express an intolerance for routine work and boring people. The quality of excitement is valued above reliability in people. There is an expressed need for change and unpredictability in stimulation.

These four facets have been widely replicated in factor analyses of the SSS in other countries and different languages (e.g., [Zuckerman, 1994, 2007](#)). The facets were moderately intercorrelated as we would expect from a hierarchical model. However some of the correlations were too high indicating a lack of discriminant validity. There were an unequal number of items in the four facets. Because the General scale was not representative of some of the facets, particularly disinhibition, it was decided to construct a new form with an equal number of items in each of the four factors, retaining the items with the best convergent (correlation with their own factor) and divergent validity. This would enable us to use a total score in place of the General scale. The total of the four facets would have content validity in the sense of a balance between the content facets that came out of the factor analysis. A second aim was to reduce the number of items in the scale from 72 to 40 by selecting the best 10 items for each of the four subfactors. After these successive revisions, Form V of the Sensation Seeking Scale (SSS-V) was constructed. Forms V and VI of the Sensation Seeking Scales are available in the appendices of [Zuckerman \(1994\)](#). In this chapter we describe subsequent SS scales developed as part of a five-factor theory.

Zuckerman has been working on the Sensation Seeking construct for 50 years and the SSS has evolved from the first version published in the 1960s to the last measure called *Zuckerman–Kuhlman–Aluja Personality Questionnaire* (Aluja et al., 2010). Zuckerman also constructed an additional measure to evaluate the states of sensation seeking and anxiety in risky situations named *Sensation Seeking and Anxiety States Scales* (SSAST). The SSAST has 36 adjective items and two factors, including positive-affect SS items and anxiety negative-affect items. The scale, scoring keys and psychometric properties are available in the appendices of [Zuckerman's \(1994\)](#) book.

Sensation-Seeking Scale (SSS Form V)

([Zuckerman, 1994](#)).

Variable

The SSS (Form V) measures the following variables: Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility.

Description

In the late 1970s, Zuckerman collaborated with Hans and Sybil Eysenck in the development of the SSS-V using a large twin sample in England ([Zuckerman, 1994](#)). This offered the combined advantage of getting a large community sample in place of the university samples previously used in scale development and undertaking a genetic analysis of the new scales. An American sample of university students was also used.

The items from the SSS-IV were administered to the participants and independent principal components analyses were conducted in four samples consisting of American and English males and females. Principal components analyses with both oblique and orthogonal rotations were used. The results for the oblique rotation were very similar so the results from the orthogonal rotations so the orthogonal were used for scale development. The same four dimensions found in Form IV were also found in each of the four samples. Form V was obtained by the selection of the best 10 items in each subscale. The 10 highest loaded items for each factor in all four samples were selected for the new 10-item scales: Thrill and adventure seeking (TAS), Experience seeking (ES), Disinhibition (Dis), and Boredom susceptibility (BS). Some items were removed because they had nearly equal loadings on other components. This reduced the intercorrelations among the four subscales as compared with those in Form IV, but the correlations still justified calculation of a Total score based on the sum of the four subscales. The clearest component was TAS since almost all items had a loading larger than 0.30. ES and Dis subscales also showed a similar good fit. On the other hand, BS presented the least satisfactory structure. The structure of the SSS-V has been replicated in various countries and cultures, including: Australia, Israel, Canada, England, and Spain. The Sensation Seeking Scale (Form V) is one of the most widely used of the sensation seeking scales (see revision by [Aluja, García, & García, 2004](#)).

Sample

The English sample comprised 254 males and 639 females from the Maudsley Twin Register, aged 15–70 years. The American sample consisted of 97 male and female undergraduates.

Reliability

Internal Consistency

Cronbach alpha coefficients for the total score ranged from 0.83 to 0.86. Those for the subscales were generally moderate (0.6 to 0.8). These coefficients were quite similar in the English and American samples, and in both sexes (Zuckerman, 1994). Despite the reduced number of items in the subscales, the only scale showing lower alpha coefficients as compared with Form IV was Experience Seeking (ES).

Validity

Convergent/Concurrent

Zuckerman (1994) reported correlations between SSS-V and NEO-PI. Total SSS-V scales correlated positively 0.45 with Openness to Experience and 0.22 with Extraversion. Aluja et al. (2003) correlated the SSS-V total score with the NEO-PI-R. Extraversion and Openness to Experience were positively and significantly related to the SSS-V Total, but the patterns for the SSS subscales were different. TAS and ES correlated most highly and significantly with NEO Openness.

Zuckerman (1994) described the relationships between the SSS IV and V and Eysenck's scales in many studies. In general the SSS correlated low to moderately with extraversion and psychoticism but not at all with neuroticism.

Divergent/Discriminant

Negative correlations between the SSS-V and NEO scales were provided in Zuckerman (1994), Table 3-10. Disinhibition scales correlated negatively with Agreeableness (-0.37), Boredom Susceptibility (-0.32) and total SSS-V scale (-0.31), and Conscientiousness correlated negatively with the Disinhibition (-0.24), Boredom susceptibility (-0.20) and total SSS-V scales.

Construct/Factor Analytic

The factor structure of the Sensation-Seeking Scale (SSS), obtained by principal components analysis and varimax rotation, in English and American samples was compared, and a new form of the SSS (Form V) applicable to both groups was developed. Three of the four factors showed good cross-national and cross-sex reliability (i.e., significant and reasonably high resemblance between the four national and gender samples). English and American males did not differ on the total SSS score, but American females scored higher than English females. Males in both countries scored higher than females on the total SSS score and on the Thrill and Adventure-Seeking and Disinhibition subscales. Significant age declines occurred for both sexes, particularly on Thrill and Adventure Seeking and Disinhibition. The Total score correlated highly ($r = 0.74$) with the SS General score from Forms II and IV.

Haynes, Miles, and Clements (2000) examined the SSS-V using Confirmatory factor analysis (CFA). *Modification Indexes* (MIs) and *Standardised Parameters Changes* (SEPCs) pointed out the existence of correlations between several items. Incorporation of the correlation of the error variances improved the fit of the four subscales, analysed in an independent way. As a result, they suggested an abbreviated version with four items for each subscale. Items were selected on the grounds of factor loadings from the modified models, and the absence of correlations with other selected items. The authors concluded that serious convergence problems were experienced with the shortened version.

Criterion/Predictive

The SSS Forms IV and V have shown a wide range of relations with phenomena associated with novel and intense experiences and weak inhibition of approach behavior in risky situations (Zuckerman, 1994, 2007). The breadth of findings far exceeded the original studies focused on sensory deprivation experiments and volunteering for novel experiments or situations perceived as risky. Hoyle et al. (2000) in their meta-analyses of sexual risk taking in 38 studies using the SSS, found mean effect sizes of 0.25 for number of sexual partners and 0.19 for general sex risk taking. Results were higher for college students and gay men relative to the general non-college population. These coefficients were higher than those found for the Eysenck Personality Questionnaire, as well as the Costa and McCrae (1992) NEO personality inventory.

Jonah (1997) reviewed the literature relating sensation seeking to risky driving. The majority of 40 studies showed significant relationships with correlations in the 0.30 to 0.40 range. The results are impressive considering that some studies used only abbreviated forms of the SSS-V which, as a rule, have lower reliabilities than the full

or total scale. The TAS subscale exhibited the highest relationship because it involves primarily an indifference to physical risk.

Monoamine oxidase type B (MAO-B) is an enzyme assessed from blood platelets which has been found to be negatively related to sensation seeking and to be low in persons with personality and clinical disorders characterized by high sensation seeking (Zuckerman, 1994). In the brain, MAO serves to regulate the monoamines particularly dopamine. Significant negative correlations were found between MAO-B and General or Total Sensation Seeking in 10 of 15 studies testing the relationship (Zuckerman, 2007). The median correlation across all studies was low, only 0.27, but in 13 of the 15 groups the correlation was negative supporting the non-chance nature of the outcome overall.

Location

Zuckerman, M. (1994). Behavioral expressions and biosocial bases of sensation seeking. New York: Cambridge University Press.

Results and Comments

Since its publication, the SSS-Form V has been the most widely used SSS form, although some researchers continued to use Forms II and IV. A new Form VI has found little use in the research literature, but is described later in this chapter.

Earlier forms of the SSS, II, IV, and V contained some terms which became anachronistic in later generations or assumed different meanings like 'swingers' and 'jet-setters.' In the current version of SSS-V (Zuckerman, 1994) such terms were either defined or changed. A more serious problem was that some items in the ES and Dis scales referred to drinking or drugs so were a confounding factor in studies of the relation between sensation seeking and actual alcohol and drug use. A similar problem arose with sexual content. Some researchers removed these items and some did not use the scales containing them. Item or scale exclusion usually made no difference in results. The ImpSS and SS scales, developed within the ZKPQ, eliminated all content describing such specific activities, replacing them with more generally stated items.

Note: The Sensation Seeking Scale Form V is available in Zuckerman (1994).

SSS-FORM V SAMPLE ITEMS

Appendices A–D. Below are examples of the forced-choice items for each subscale:

Directions: Each of the items below contains two choices A and B. Please indicate which of the choices most describes your likes or the way you feel.

1. A. I like 'wild' uninhibited parties.
B. I prefer quiet parties with good conversation.
2. A. There some movies I enjoy seeing a second or even third time.

B. I can't stand watching a movie that I've seen before.

3. A. I often wish I could be a mountain climber.
B. I can't understand people who risk their necks climbing mountains.
4. A. I dislike all body odors.
B. I like some of the earthy body smells.

Notes: Scoring keys: TAS: 3A; ES: 4B; Dis: 1A; BS: 2B.
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Sensation-Seeking Scale (SSS Form VI)

(Zuckerman, 1994).

Variable

The SSS-VI measures the following variables: Experience – TAS; Experience – Dis; Intentions – TAS; and Intentions – Dis.

Description

The SSS (Form VI) has two sections using the same items in both (Zuckerman, 1994). However the first section deals with experience and uses a three point Likert-type response scale, i.e., 1. I have never done this. 2. I have done this once. 3. I have done this more than once. The second part is an intentions scale and also uses a three

choice response format: 1. I have no desire to do this. 2. I have thought of doing this but will probably not do it. 3. I have thought of doing this and will do it if I have the chance. Two subscales are used in both the experience and intention forms: TAS and Dis. These two subscales were chosen simply because they lent themselves most easily to the experience/intentions formats. The scales allow a contrast between past and present behavior and between behavior and fantasy.

Factor analysis showed a distinction between TAS and Dis factors in the intentions scale for both men and women, but in the experience scale only for women. The scores are based on the two factors in the intentions scale although the same factor items are scored in the experience scale for the sake of comparability. The four scores are: Experience-TAS; Experience-Dis; Intentions-TAS; Intentions-Dis. Experience and intentions correlate highly for Dis (0.70 to 0.78), whereas they correlate only moderately for TAS (0.44 to 0.58), possibly because the activities described are more unusual and less likely to have been carried out at a young college age.

Sample

The samples involved in the development of the SSS-VI are described in the original article (Zuckerman, 1984), not currently accessible to us.

Reliability

Internal Consistency

Cronbach alpha coefficients were high for the two I scales and the E-Dis, ranging from 0.83 to 0.94. They were somewhat lower for the E-TAS scale (0.62 to 0.66) (Zuckerman, 1994).

Test–Retest

Retest reliabilities for a 7-week interval were high, being 0.93 for the E-TAS and E-Dis scales and 0.87 and 0.84 respectively for I-Dis and I-TAS scales (Zuckerman, 1994).

Validity

Convergent/Concurrent

Form VI I-Dis correlated highly with Form V Dis (0.60 to 0.76) as did Form VI E-Dis (0.56 to 0.80). Form VI I-TAS also correlated highly with Form V TAS (0.64 to 0.79), but Form VI E-TAS and Form V TAS correlated at lower level (0.37 to 0.53).

Divergent/Discriminant

Zuckerman (1994) reported correlations between SSS-VI and EPQ E-Dis and I-Dis TAS ranging from -0.27 and -0.30 , as well as -0.30 and -0.28 with the EPQ Lie scale for males and females respectively. The correlations of E-Dis and I-Dis with Crowne and Marlowe Social Desirability Scale were moderate only for men (-0.40).

Construct/Factor Analytic

A principal components analysis was carried out to analyze the structure of the SSS-VI. The intention part yielded two primary dimensions clearly identifiable as TAS and Dis in men and women. The Experience part, however, yielded the two dimensions in women but they tended to overlap for men. Of the initial 80 items, 64 loaded over 0.30 on either TAS or Dis factors, and lower on the other factors for both men and women (Zuckerman, 1994).

Criterion/Predictive

The TAS scale items were nearly all of intention or desire type, because it was assumed that few young persons would have the chance to engage in some of the more unusual thrill-seeking activities, like parachuting. Some Dis items referred to preferences or aversions for activities already experienced. ES could be restricted by lack of environmental opportunity or financial resources. The more behaviorally items were based on reports of past experiences (Zuckerman, 1994).

Location

Zuckerman, M. (1994) *Behavioral expressions and biosocial bases of sensation seeking*. Appendices E–H New York: Cambridge University Press.

Results and Comments

Form VI is not a substitute for Form V since it is missing the ES, BS and total scores from that form. It should only be used where the interest is solely in TAS and Dis scales and where the queries about the specific types of experience would be appropriate and acceptable to the population tested (Zuckerman, 1994).

SSS (ACTIVITIES SCALE, FORM-VI) SAMPLE ITEMS

This questionnaire has two parts: part I (Experience; the first 64 items) and Part II (Intentions for the future; 65 to 128 items). Next it is listed as example an item of each one of the four scales:

Directions: Part I: Below you will find a list of many different kinds of activities. Please indicate whether you have actually engaged in this activity or not in the past (Part II: ...engaged in this activity in the future). Answer all items using one of the following options: Part I: A. I have done this; B. One response for each of the items: A, B or C. Part II: I have no desire to do this. B. I have thought of doing third, but probably will not do it. C. I have thought of doing this and will do it if I have the chance.

Examples:

13. Parachute jumping (E-TAS)

2. Reading books about explicit sex (E-Dis)
65. Climbing steep mountains. (I-TAS)
66. Reading books about explicit sex (I-Dis)

Scoring keys:

In scoring either Experience or Intention scales each response is weighted as follows: A: 1; B: 2; C: 3. All the weighted responses for each of the four subscales are summed and the total constitutes the raw score for that scale.

Infrequency (7 items): 11; E-Dis. (42 items): 2; I-TAS: (22 items). 65; I-Dis (42 items): 66.

Notes:

The Sensation Seeking Scale Form VI is published and available in Zuckerman (1994).

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Impulsive Sensation Seeking Scale (ImpSS) – (from ZKPQ)

(Zuckerman et al., 1993).

Variable

The ZKPQ (alternative Big Five) measures the following variables: Impulsive Sensation Seeking, Aggression–Hostility, Activity, Sociability, and Neuroticism–Anxiety.

Description

By the late 1980s the 4-factor form of the SSS had become a validated and useful measure of the sensation seeking construct in many diverse areas. A larger question was posed: how did the SS construct fit into the wider realm of personality? At that time the most popular factor models were Eysenck's three-factor theory and Cattell's 16-factor theory. A reliable 5-factor model had emerged from analyses of general traits as derived from ratings based on single adjectives. Costa and McCrae began with a three-factor model in a questionnaire form, but later added two more factors resembling the 'Big Five' promulgated by Goldberg and others (Costa & McCrae, 1992). Their questionnaire has been the most popular one used in personality trait studies although its claim to primacy among personality trait models has not gone unchallenged (Block, 1995; Boyle, 2008; Eysenck, 1992; Zuckerman, 1992).

Sensation seeking was not represented as a major factor in the Big Five, partly because of the paucity of adjectives describing the trait in the earlier lexical studies and the limited number of sensation seeking items in the analyses of the Costa and McCrae exploratory forms. The belief that sensation seeking was a primary dimension of personality was based on its high heritability, many biological and physiological correlates, found in animal behavioral models as well as studies of humans, and the range of its behavioral correlates. Impulsivity was another trait not well represented in the Big Five, except as a facet of Neuroticism.

Zuckerman, Kuhlman, and Camac (1988) and later, Zuckerman, Kuhlman, Thornquist, and Kiers (1991), proposed an alternative 5-factor model formed by Impulsive Sensation Seeking (ImpSS), Aggression–Hostility (Agg-Host), Activity (Act), Sociability (Sy), and Neuroticism–Anxiety (N-Anx). Unlike Costa and McCrae's theoretical model, both Eysenck and Zuckerman's models provide a causal explanation of personality. These three models show similar factorial structures for the first three or four factors (Zuckerman et al., 1993).

Zuckerman and colleagues began with selection of 46 scales representing traits that had been widely used in studies of the biological basis of personality (Zuckerman et al., 1988). The selection included the four sensation seeking facets from the SSS-V and various impulsivity scales. A robust five-factor solution, emerged from the factor analyses of these scales including: Neuroticism–Anxiety, Aggression–Hostility, Sociability, Activity, and Impulsive Sensation Seeking. The factor structure was replicated in a second sample (Zuckerman et al., 1991). In subsequent sections we will focus on the ImpSS factor and scales. Information on the other scales can be found in Zuckerman (2002a, 2002b, 2008a, 2008b).

Item analyses and factor analyses of items were used to develop scales for the five primary factors (Zuckerman et al., 1993). Further factor analyses of the intercorrelations of the items within the ImpSS scale revealed two subfactors. Eleven items reflected sensation seeking or general need for thrills and excitement and a general need for change and novelty. Unlike the SSS, in which some of the items referred to specific activities like sex, drugs, and drinking, the ZKPQ items are not that specific and therefore avoided the confounding factor in some items of the SSS-V and earlier forms.

Nine items described impulsivity, as primarily due to a lack of planning and a tendency to act without thinking. The Imp and SS items may be scored together and/or scored for the separate Imp and SS components. The connection between sensation seeking and impulsivity may be due to common biological correlates or a '*marriage of traits made in biology*' (Zuckerman, 1993). The ImpSS scale is shown below; note the change in response format from the forced choice response format in the SSS to the True–False format in the ZKPQ.

Sample

In two American studies, samples included 522 undergraduate students and in a second study 157 participants (Zuckerman et al., 1993). In a Spanish study (Aluja et al., 2004), the participants were 1006 volunteer psychology undergraduates from Spanish universities (367 male and 639 female). The mean age was 22.16 years ($SD = 4.81$) for males, and 22.31 years ($SD = 5.08$) for females.

Reliability

Internal Consistency

Zuckerman et al. (1993) reported Cronbach alpha coefficients obtained in two studies that ranged from 0.72 to 0.86. Participants were 1006 psychology undergraduates. The ImpSS scale exhibited alpha coefficients of 0.77 and 0.78 in the studies (males and females). In the Aluja et al. (2004) study, the alpha coefficients ranged from 0.77 to 0.85 in males and females (ImpSS: 0.83). Alpha coefficients for the ImpSS in male and female samples in eight countries, including seven translated scales, ranged from 0.68 to 0.84 with a median of 0.80 (see Table 11.2 in Zuckerman, 2008a, 2008b).

Test–Retest

Test–retest reliabilities for ImpSS over a 3–4 week interval in an American sample was 0.80 and over six weeks, and seven months in German samples were 0.80 and 0.78 respectively (Schmitz, 2004).

Validity

Convergent/Concurrent

Convergent correlation coefficients link ImpSS with EPQ P and NEO conscientiousness, Sy with EPQ and NEO E, N-Anx with EPQ and NEO N, and Agg-Host with NEO Agreeableness. Also, correlations of ImpSS with observer ratings, friends and relatives (Angleitner, Riemann, & Spinath, 2004) and spouses were 0.50 and 0.63 respectively.

Divergent/Discriminant

ImpSS obtained a correlation of -0.25 with NEO Agreeableness and -0.53 with Conscientiousness (Aluja, García, & García, 2002).

Construct/Factor Analytic

Zuckerman et al. (1993) performed an exploratory factor analysis (EFA) with the EPQ-R (Eysenck Personality Inventory – Revised), the ZKPQ (Zuckerman–Kuhlman Personality Questionnaire, form III – Revised; Zuckerman et al., 1993), and the NEO-PI-R (NEO Personality Inventory Revised; Costa & McCrae, 1992). The Neuroticism scales from the EPQ-R and the NEO-PI-R grouped together with the Neuroticism–Anxiety Scale of

the ZKPQ-III-R. In a second factor, the Extraversion Scales of the EPQ-R and the NEO-PI-R grouped with the Sociability and Activity Scales of the ZKPQ. The three instruments share common factors of Extraversion and Neuroticism within two of the primary factors.

In the three-factor structure, the Psychoticism Scale of the EPQ-R, and the Agreeableness and Conscientiousness Scales of the NEO-PI-R define the third factor. Impulsive Sensation Seeking and the Aggression–Hostility of the ZKPQ have their largest loadings on this factor. In the four-factor structure, the Psychoticism factor was split into two factors. Conscientiousness, Psychoticism, and Impulsive Sensation Seeking define one of them, whereas Agreeableness, Aggression–Hostility, and Openness load mainly on the other. In another analysis, the 30 facets of the NEO-PI-R were used instead of the Big-Five factor scales. These results corroborated the previous 4-factor structure plus an additional factor exclusively formed by the 6 NEO Openness facets. Correlations between the ZKPQ ImpSS and EPQ and NEO scales were: 0.55, 0.28, 0.01, –0.51, 0.28, 0.01, 0.23, and 0.00 for Psychoticism, Extraversion, Neuroticism of EPQ and Conscientiousness, Extraversion, Neuroticism, Agreeableness and Openness, respectively.

Criterion/Predictive

Ball (1995) used the ZKPQ in a study of 450 cocaine abusers seeking treatment. ImpSS correlated with severity of drug abuse and addiction and predicted treatment outcome. ImpSS is correlated with substance use and abuse in community and college samples and risk taking in general.

The ImpSS can be broken down into two subscales: impulsivity and sensation seeking. In a laboratory study a measure of betting persistence in the face of increasing loss was related to the impulsivity (Imp) but not to the sensation seeking (SS) subscale (Breen & Zuckerman, 1999).

In their review of sexual behavior, Hoyle et al. (2000) compared the SSS-V with the ZKPQ ImpSS. The SSS was superior in prediction of number of partners (0.33 to 0.19) but the ZKPQ was better for predicting other high-risk sex encounters (0.27 vs. 0.19). In any broad criterion like ‘*risky sexual behavior*’ or ‘*risky driving behavior*’ there are different kinds of criteria and the type and degree of prediction may depend on the specific criteria. For instance in prediction of acculturation patterns in immigrants to Germany (Schmitz, 2004) the ZKPQ SS subscale correlated positively with integration and negatively with separation modes of adjustment, but the Imp subscale correlated negatively with integration and positively with marginalization.

Location

Zuckerman, M., Kuhlman, D. M., Joireman, J., Teta, P., & Kraft, M. (1993). A comparison of three structural models for personality: The big three, the big five, and the alternative five. *Journal of Personality and Social Psychology*, 65, 757–768.

Aluja, A., García, O., & García, L.F. (2004). Replicability of the three, four and five Zuckerman’s personality super-factors: exploratory and confirmatory factor analysis of the EPQ-RS, ZKPQ and NEO-PI-R. *Personality and Individual Differences*, 36, 1093–1108.

Aluja, A., García, Ó., & García, L.F. (2002). A comparative study of Zuckerman’s three structural models for personality through the NEO-PI-R, ZKPQ-III-R, EPQ-R and Goldberg’s 50-bipolar adjectives. *Personality and Individual Differences*, 33, 713–725.

Results and Comments

Data from Zuckerman et al. (1993) showed that the EPQ-R, ZKPQ and NEO-PI-R questionnaires could be well described by a three-factor model. The three-factor structure highlights the negative relationships of Psychoticism with Agreeableness and Conscientiousness. This argument was also sustained by Eysenck (1991) and other investigators although with different interpretations (Draycott & Kline, 1995; John, 1990; Saggino, 2000). The Aggression–Hostility and Impulsive Sensation Seeking Scales of the ZKPQ would be integrated in the Psychoticism factor.

Replicating Costa and McCrae’s findings (1992), Openness loads on the Extraversion factor in the three-factor model. In a four-factor analysis Impulsive Sensation Seeking loads on a factor along with EPQ Psychoticism and NEO Conscientiousness and the primary correlations of Impulsive Sensation Seeking are with these two scales. Significant but much lower correlations are found between Impulsive Sensation Seeking and EPQ Extraversion. Construct and predictive validity studies have replicated many of the findings using the SSS-V scales with a number of new findings generally supporting the construct validity of the SS scales developed within the alternative five theory assessed by the ZKPQ. A caution is that the results are sometimes specific to the particular subscale of the SSS or ImpSS or the particular behavioral criteria used.

IMPULSIVE SENSATION SEEKING SCALE (IMPSS) – (FROM ZKPQ)

Directions: If you agree with a statement or decide that it describes you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer every statement either True or False even if you are not entirely sure of your answer.

1. (1) [I] I tend to begin a new job without much advance planning on how I will do it.
2. (6) [I*] I usually think about what I am going to do before doing it.
3. (14) [I] I often do things on impulse.
4. (19) [I] I very seldom spend much time on the details of planning ahead.
5. (24) [SS] I like to have new and exciting experiences and sensations even if they are a little frightening.
6. (29) [I*] Before I begin a complicated job, I make careful plans.
7. (34) [SS] I would like to take off on a trip with no preplanned or defining routes or timetable.
8. (39) [I] I enjoy getting into new situations where you can't predict how things will turn out.
9. (45) [SS] I like doing things just for the thrill of it.
10. (50) [SS] I tend to change interests frequently.
11. (55) [SS] I sometimes like to do things that are a little frightening.
12. (60) [SS] I'll try anything once.
13. (65) [SS] I would like the kind of life where one is on the move and traveling a lot with lots of change and excitement.
14. (70) [SS] I sometimes do 'crazy' things just for fun.
15. (75) [SS] I like to explore a strange city or section of town by myself, even if it means getting lost.
16. (79) [SS] I prefer friends who are excitingly unpredictable.
17. (84) [I] I often get so carried away by new and exciting things and ideas that I never think of possible complications.
18. (89) [I] I am an impulsive person.
19. (95) [SS] I like 'wild' uninhibited parties.

Notes:

1. Item numbers in parentheses are those for the item in the 99 item ZKPQ. An 'I' in the brackets indicates it is an impulsivity item; 'SS' in the brackets indicates a sensation seeking item. The total ImpSS score consists of all the items, but some investigators may also be interested in scoring the I and SS subscales separately. All items are scored 1 for the 'True' response except for items 2 and 6 where the star after the 'I' indicates scoring for the 'False' response.
2. This table is adapted from Table 2.3 (p. 46) in M. Zuckerman (1994) Behavioral expressions and biosocial bases of sensation seeking, published by Cambridge University Press.
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Impulsive Sensation Seeking Scale (ImpSS) – (from ZKPQ 69-item short form)

(Aluja et al., 2003).

Variable

The ZKPQ (69-item form) measures the following variables: Impulsive Sensation Seeking, Aggression–Hostility, Activity, Sociability, and Neuroticism–Anxiety.

Description

This ZKPQ 69-item shortened version was developed by Aluja et al. (2003) after discovering that several of the ZKPQ 89-items (without Infrequency scale) were grouped into different factors than in the (Aluja et al., 2003) principal components analyses, while other items were highly correlated among them (and Modification Indexes regarding covariance among them were also high). The structure of the questionnaire was analysed by Exploratory (EFA) and Confirmatory Factor Analysis (CFA) procedures. It was found that a 69-item model showed better fit, similar reliability coefficients, and slightly better construct and convergent validity than the 89-item version. Internal consistency coefficients were acceptable and similar to those reported in Zuckerman et al. (1993).

Sample

The sample was composed of 1006 undergraduate students (367 male and 639 female) following different degrees: Law, Education Science, Physical Education, and Marketing, from three Spanish universities. The mean age was 22.16 years ($SD = 4.81$) for males, and 22.31 years ($SD = 5.08$) for females.

Reliability

Internal Consistency

Cronbach alpha coefficients for the ImpSS 69-item version were 0.78 and 0.81 for males and females respectively (Aluja et al., 2003).

Test–Retest

Test–retest reliability coefficients have not been reported to-date.

Validity

Convergent/Concurrent

The original ZKPQ 89-items and 69-item versions were correlated with the EPQ-R, the SSS Form V and the NEO-PI-R, for both the original 89-item and the 69-item versions, with very similar values for both. EPQ N correlated highly with N-Anx (0.81) and somewhat lower with Agg-Hos (0.36). EPQ E was related to Sy (0.69 and 0.66). The EPQ-P scale was related to ImpSS (0.56 and 0.53) and to Agg-Hos (0.29 and 0.25). Thus, the SSS scales were essentially related to ImpSS and to a lesser extent, to Agg-Hos, Sy, and Act. The NEO-O scale was only related to ImpSS (0.32 and 0.33). NEO-O was only related to ImpSS (0.32 and 0.33). NEO-C was more highly related (negatively) to ImpSS (-0.50 and -0.45) and positively to Act (0.26 and 0.24) (Aluja et al., 2003).

Divergent/Discriminant

The NEO-A measure was negatively correlated with Agg-Hos (-0.55 and -0.51) and to ImpSS (-0.25 and -0.25) – (Aluja et al., 2003).

Construct/Factor Analytic

In the Aluja et al. (2003) study we have used AMOS 4.0 CFA techniques to compare the fit of the items to their respective EFA principal components generated factors. Fit indices of five ZKPQ models with both orthogonal and oblique rotations, were compared to its original 89-item version. The simple structure of the 69-item model obtained low indices although higher than those reported elsewhere with several personality structural models derived through EFA (Borkenau & Ostendorf, 1990; Church & Burke, 1994; Vassend & Skrondal, 1995). In the 69-item EFA structure, the secondary loadings were low, but nevertheless, the fit improved when correlated error terms were added as well. When the five-factor 69-item version of the ZKPQ factors was analysed independently through CFA, fit indices were adequate except for the Agg-Hos scale.

Criterion/Predictive

In the Aluja, García, Blanch, De Lorenzo, and Fibla (2009) study, the association between different impulsive–disinhibited personality traits, such as Psychoticism, Sensitivity to Reward, Sensation-Seeking (ZKPQ-69), Aggressiveness, and 5-HTTLPR and 5-HTTVNTR genetic polymorphisms were evaluated in an imprisoned male sample. Higher scores of the impulsive–disinhibited personality traits tended to be associated with both, carrying one or two copies of the 5-HTTLPR S allele (S/S homozygous and S/L heterozygous) and carrying two copies of the 5-HTTVNTR 12 allele (12/12 homozygous). Genotype, allele, haplotype and extended genotype distribution between low and high impulsive-disinhibited groups confirmed this association. Allele S and genotypes S/S + S/L at the 5-HTTLPR locus and allele 12 and genotype 12/12 at the 5-HTTVNTR locus were overrepresented in the high scoring group. The inmates carrying Androgen Receptor (AR) CAG repeats length short and GGN long haplotype group (short–long haplotype) obtained higher scores on all personality scales. Differences were found for the Impulsive Sensation-Seeking scale (age-adjusted multivariate analysis, $p < 0.016$) and z index ($p < 0.036$), when comparing extreme groups in the impulsive–disinhibited personality (Aluja, García, Blanch, & Fibla, 2011).

Location

Aluja, A., García, Ó., & García, L.F. (2003). Psychometric properties of the Zuckerman–Kuhlman personality questionnaire (ZKPQ-III-R): a study of a shortened form. *Personality and Individual Differences*, 34, 1083–1097.

Results and Comments

The ZKPQ 69-item version is a refined shortened version that includes the best ZKPQ items after sophisticated item analysis using EFA and CFA procedures. The five-factor structure is very robust. Convergent and discriminant validity is similar to that obtained by correlational analysis with the EPQ-RS, the SSS-V and the NEO-PI-R, corroborating the

outcomes found by Zuckerman et al. (1993) and Zuckerman, Joireman, Kraft, and Kuhlman (1999). This shortened version provides the researchers with a valid and reliable measure of the Zuckerman personality model with 20 items less.

IMPULSIVE SENSATION SEEKING SCALE (FROM ZKPQ 69-ITEM SHORT-FORM)

- | | |
|--|--|
| 1. (1) [I] I tend to begin a new job without much advance planning on how I will do it. | 9. (55) [SS] I sometimes like to do things that are a little frightening. |
| 2. (14) [I] I often do things on impulse. | 10. (65) [SS] I would like the kind of life where one is on the move and traveling a lot with lots of change and excitement. |
| 3. (19) [I] I very seldom spend much time on the details of planning ahead. | 11. (70) [SS] I sometimes do 'crazy' things just for fun. |
| 4. (24) [SS] I like to have new and exciting experiences and sensations even if they are a little frightening. | 12. (75) [SS] I like to explore a strange city or section of town by myself, even if it means getting lost. |
| 5. (34) [SS] I would like to take off on a trip with no preplanned or defining routes or timetable. | 13. (79) [SS] I prefer friends who are excitingly unpredictable. |
| 6. (39) [I] I enjoy getting into new situations where you can't predict how things will turn out. | 14. (84) [I] I often get so carried away by new and exciting things and ideas that I never think of possible complications. |
| 7. (45) [SS] I like doing things just for the thrill of it. | |
| 8. (50) [SS] I tend to change interests frequently. | |

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ImpSS Scale from Cross-Cultural Shortened Form of ZKPQ (ZKPQ-50-CC)

(Aluja et al., 2006).

Variable

The ZKPQ-50-CC measures the following variables: Impulsive Sensation Seeking, Aggression–Hostility, Activity, Sociability, and Neuroticism–Anxiety.

Description

Those who use tests for research are always demanding shorter forms. Many of these short forms lose reliability because of the loss of items and show attenuated relationships with the original long forms. Aluja et al. (2006) and Aluja et al. (2007b) developed a short form of the ZKPQ in four languages: English (United States), French (Switzerland), German (Germany), and Spanish (Spain).

An exploratory factor analysis was conducted in the calibration sample and a confirmatory factor analysis in a different validation sample. Using several criteria derived from EFA and CFA item analysis, including modification index and standardized regression weights, 10 items per scale were selected. This short version (named ZKPQ-50-CC) presents psychometric properties strongly similar to the original version in the four countries. The factor structure was near equivalent across the four countries since the congruence indices were all higher than 0.90. The results were five 10-item scales representing the original five ZKPQ factors in all four countries and languages. Cross language similarity of the five factors was high and the scales correlated highly with their longer versions. The same items were used for all five scales in all four cultures.

The ImpSS 10-item scale contained only two Imp compared with eight SS items, compared with eight Imp and 11 SS in the ZKPQ. Thus impulsivity plays a smaller role in the total ImpSS score in the short form. However we kept the original label for the scale even though it is more of a general SS scale. There are not enough items representing impulsivity to score it as a separate facet of ImpSS in this shortened scale.

Sample

The total sample included 4621 participants (1667 males [36.1%], and 2954 females [63.9%]). The sample was randomly divided into calibration ($N = 2322$) and validation ($N = 2299$) groups. The numbers of subjects in the four countries were 517 from Germany (Mean age: 26.94 years; $SD = 4.31$), 962 from Spain (Mean age: 21.39 years; $SD = 2.97$), 764 from the French-speaking part of Switzerland (Mean age: 21.68 years; $SD = 3.05$), and 2378 from the United States of America (age was not coded for this sample).

Reliability

Internal Consistency

All scales exhibited Cronbach alpha coefficients above 0.70 in each country, except for the Agg-Host scale in Germany, Spain and Switzerland, and the Sy scale in Germany. However, these latter alpha coefficients were only slightly lower (0.60 to 0.68) (Aluja et al., 2006).

Test–Retest

No test–retest reliability coefficients have been reported to-date.

Validity

Convergent/Concurrent

Convergent validity of the ZKPQ-50-CC was analyzed by Aluja and Blanch (2011) correlating similar ZKPQ-50-CC with TCI-R and NEO-FFI-R scales. The positive correlations with similar content scales were found between ZKPQ-50-CC and TCI-R scales: ImpSS and Novelty Seeking (0.50), N-Anx and Harm Avoidance (0.58), Sy and Reward Dependence (0.55), Act and Persistence (0.52), and ImpSS and Self-Transcendence (0.30). The positive correlations between the ZKPQ-50-CC and the NEO-FFI-R similar content scales were: ImpSS and Extraversion (0.41), N-Anx and Neuroticism (0.68), and Sy and E (0.64). Positive correlations were found between the ZKPQ-50-CC and NEO-FFI-R instruments: ImpSS and Extraversion (0.41), N-Anx and Neuroticism (0.68), and Sy and E (0.64). The convergent validity results are similar to those found between the full ZKPQ and the TCI.

Divergent/Discriminant

Negative correlations were found between the ZKPQ-50-CC and NEO-FFI-R instruments: e.g., ZKPQ Agg-Host correlated (-0.43) with Agreeableness. The ZKPQ ImpSS correlation with conscientiousness was (-0.51), while with extraversion it was only 0.23.

Construct/Factor Analytic

Structural validity was analyzed by both exploratory (EFA) and confirmatory factor analyses (CFA). Five factors were explicitly extracted in the EFA calibration sample using a principal components method with Varimax rotation ($N = 4621$). The five factors accounted for 25.69% of the variance. A CFA was then performed on the 50 items ($\chi^2 = 5664.66$; d.f. = 1165; $\chi^2/\text{d.f.} = 4.86$; SMSR = 0.01; CFI = 0.78; GFI = 0.90; RMSEA = 0.04). Correlations between the latent variables for oblique models were: ImpSS/N-Anx: $-0.11/-0.04$; ImpSS/Agg-Host: $0.31/0.34$, ImpSS/Act: $0.19/0.14$, ImpSS/Sy: $-0.40/-0.36$, N-Anx/Agg-Host: $0.28/0.24$, N-Anx/Act: $-0.05/-0.08$, N-Anx/Sy: $0.17/0.19$, Agg-Host/Act: $0.04/0.03$, Agg-Host/Sy: $-0.08/-0.09$ and Act-Sy: $-0.18/-0.19$.

Criterion/Predictive

The ZKPQ-50-CC predicts MCMI-III personality disorder (PD) scales. ImpSS is the most relevant predictor for the Narcissistic, Antisocial and Obsessive–Compulsive (negative) PDs. Finally, Agg-Host and Agreeableness presented an opposite pattern of results. Agg-Host was the most predictive dimension for the Sadistic disorder, and contributed to the Paranoid, Antisocial, Narcissistic, Dependent and Passive–Aggressive PDs (Aluja et al., 2007).

Location

Aluja, A., Rossier, J., García, L.F., Angleitner, A., Kuhlman, D.M., & Zuckerman, M. (2006). A cross-cultural shortened form of the ZKPQ (ZKPQ-50-CC) adapted to English, French, German and Spanish languages. *Personality and Individual Differences*, 41, 619–628.

Results and Comments

The results of ZKPQ-50-CC study represent, therefore, a double contribution to the ZKPQ literature: (1) demonstrating the cross-cultural validity of Zuckerman's Alternative Five Factor Personality Model; and (2) developing a short version with good psychometric and structural properties in four different languages (English, French, German, and Spanish). The cross-cultural design and the use of multivariate statistical procedures in its development give this short version the edge over the 35-item, and 69-item ZKPQ versions, developed with American and Spanish samples, respectively.

IMPSS SCALE (FROM ZKPQ-50-CC) SAMPLE ITEMS

Instructions: On this page you will find a series of statements that people might use to describe themselves. Read each statement and decide whether or not it describes you. If you agree with a statement or decide that it describes you answer TRUE, marking the letter T with a cross. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE, marking the letter F with a cross.

T = TRUE; F = FALSE

(Mark the chosen letter with a cross)

Answer every statement either True (T) or False (F) even if you are not entirely sure of your answer.

Example: T F I have always told the truth.

6	T F	*14. I often do things on impulse.
13	T F	34. I would like to take off on a trip with no pre-planned or definite routes or timetables.
17	T F	39. I enjoy getting into new situations where you can't predict how things will turn out.
24	T F	55. I sometimes like to do things that are a little frightening.
26	T F	60. I'll try anything once.
30	T F	65. I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.
34	T F	70. I sometimes do 'crazy' things just for fun.
39	T F	79. I prefer friends who are excitingly unpredictable.
42	T F	84. I often get so carried away by new and exciting things and ideas that I never think of possible complications.
49	T F	95. I like 'wild' uninhibited parties.

Notes:

*Corresponds to number on ZKPQ (full version). e.g., Item 6 in the ZKPQ-50 is Item 14 on the ZKPQ.

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Sensation Seeking Scale – from Zuckerman–Kuhlman–Aluja Personality Questionnaire (ZKA-PQ)

(Aluja, Kuhlman, & Zuckerman, 2010b).

Variable

The ZKA-PQ measures the following variables:

Domains: Neuroticism, Activity, Extraversion, Sensation Seeking, and Aggressiveness.

Facets: Physical Aggression, Verbal Aggression, Anger; Hostility, Work Compulsion, General Activity, Restlessness, Work Energy, Positive Emotions, Social Warmth, Exhibitionism, Sociability, Anxiety, Depression, Dependency, Low Self-Esteem, Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility/Impulsivity.

Description

Most contemporary personality trait models are based on a hierarchal model in which broader traits, like E, N, and P or the Big Five contain narrower traits, which in turn may contain even narrower traits until we get down to the level of specific habits. Many models start with measures of the broader traits and only later, if ever get down to defining the narrower traits or facets that make up the broader traits.

The original factor analyses of the SSS yielded four facets of sensation seeking (Zuckerman, 1994). However the analyses that led to the development of the ZKPQ used a much more limited sample of SSS items because four other major factors had to be defined. Consequently only two facets of sensation seeking, impulsivity and general sensation seeking were defined. In order to better define all five ZKPQ factors a larger sampling of candidate items were factored in order to develop a factor/facet model. Using previous factor analytic research (e.g., Eysenck & Wilson, 1991; McCrae & Costa, 2008), Aluja et al. (2010b) selected a sample of items for possible facets of five major factors. Subscales of impulsivity were added to the original sampling of items on the

possibility that this trait would emerge as a major factor or a separate facet of sensation seeking. All of the original sensation-seeking items were included. One hundred items for each potential factor including 20 items for each of the five hypothesized facets were included.

Scale development occurred in two phases. First, factor analyses were done on the 20 items within each facet of each factor. The ten best items for each facet were selected on the basis of highest loadings on the facet total and relatively lower loadings on the other facets within the factor. Next factor analyses were done using the 25 facet scores. The result was that some facets within some factors were too weak so that the weakest facet was removed from each factor leaving four facets for each. For instance an antisocial facet had been postulated for the SS factor, but the factor analysis of facets did not justify the existence of such a facet on this or other factors. A separate impulsivity facet was predicted for the SS factor, but instead the original four factors from the SSS IV and V emerged again from this analysis. They were easily recognized from their content although all items from the SSS with specific content relating to sex, drugs, or drinking had been replaced by more general items. However some items from the Lack of Premeditation impulsivity scale did load on the Boredom Susceptibility facet so this facet was renamed. The final four facets of the SS factor were labeled: SS1. Thrill and Adventure Seeking; SS2. Experience Seeking; SS3. Disinhibition; SS4. Boredom Susceptibility/Impulsivity.

Thus we have come back to the original structure of facets in the SSS, with impulsivity relegated to some items in the BS scale and exclusion of content confounding items. Given the confirmation of the factor structure in other samples, it is recommended that investigators use this new sensation seeking scale in preference to the older one in the SSS-V. This scale is extracted from the larger ZKA-PQ and the results could be different from those using the SSS-V scales. Replication should be checked. Note that it uses a four-point Likert-type response format in place of the true–false format of the original ZKPQ and the forced choice form of the SSS-V.

Sample

Five samples were analyzed in the development of the ZKA-PQ. The first two samples consisted of Spanish individuals who answered the questionnaire anonymously. The first sample consisted of 1042 subjects (559 women, and 483 men) with a mean age of 38.6 years ($SD = 16.02$). The second sample had 529 subjects (271 women and 258 men) with a mean age of 44.2 ($SD = 18.12$). The third sample consisted of 480 American undergraduate students (360 women, 119 men) from an introductory psychology course with a mean age of 18.48 years ($SD = 0.87$).

Reliability

Internal Consistency

Cronbach alpha coefficients for the total factor and the facet scores were estimated in the Spanish and American samples. The mean alpha coefficient for the five factors was 0.88 (Spanish sample) and 0.91 (American sample). Alpha coefficients for the Sensation Seeking dimension were 0.70 and 0.72 for the Spanish and USA samples, respectively. For the four SS facets, alpha coefficients for the Spanish sample were: SS1: 0.73; SS2: 0.70; SS3: 0.72; and SS4: 0.65, respectively. For the USA sample, they were 0.81, 0.73, 0.73, and 0.61 respectively. Only alpha coefficient for the SS4, Boredom susceptibility/Impulsivity, was less than 0.70.

Test–Retest

Test–retest reliability coefficients are not currently available for the ZKA-PQ.

Validity

Convergent/Concurrent

Convergent validity of the ZKA-PQ was studied by correlating its factors with the NEO-FFI-R and the TCI-R 140. The ZKA-PQ alternative Big Five scales correlated positively with the corresponding scales of the NEO-FFI-R Neuroticism (0.71), Extraversion (0.62), Openness (0.27), Agreeableness (0.32), and Conscientiousness (0.34). Also positive correlations were obtained between the ZKA-PQ scales and the corresponding scales of the TCI-R 140 Novelty Seeking (0.51), Harm Avoidance (0.58), Reward Dependence (0.47) and Persistence (0.69) respectively (Aluja et al., 2010). Likewise, García et al. (2012) reported that:

the ZKPQ and the TCI-R Impulsive Sensation Seeking correlated with Novelty Seeking (0.66), Neuroticism–Anxiety with Harm Avoidance (0.68), and Aggression–Hostility with Cooperativeness (0.60), with some lower correlations: Activity correlated with

Persistence (0.46), Self-Directiveness with Neuroticism–Anxiety (0.49) and Aggression–Hostility (0.32), Reward Dependence with Sociability (0.31) and Aggression–Hostility (0.27), and Self-Transcendence with Impulsive Sensation Seeking (0.28). In an unpublished doctoral dissertation, [Dolcet \(2006\)](#) correlated the factors of a short version of the ZKPQ (ZKPQ-50-CC; [Aluja et al., 2006](#)) with TCI-R in a sample from the Spanish population. Reported results were very similar to those of [Zuckerman and Cloninger \(1996\)](#).

Divergent/Discriminant

Aluja et al. (2010) also found negative and significant correlations between ZKA-PQ factors and NEO-FFI-R and the Cloninger TCI-R 140. The five ZKA-PQ scales correlated negatively with the NEO-FFI-R scales, as follows: Aggressiveness–Agreeableness (– 0.53), Aggressiveness–Conscientiousness (– 0.32), Sensation Seeking–Agreeableness (– 0.28), Sensation Seeking–Conscientiousness (– 0.36). Negative correlations between the ZKA-PQ scales and the TCI-R 140 scales were as follows: Aggressiveness–Self-Direction (– 0.46), Aggressiveness–Cooperativeness (– 0.49), Neuroticism–Self-Direction (– 0.64).

Construct/Factor Analytic

The construct validity of the ZKA-PQ was analyzed by means of exploratory factor analysis based on the inter-correlations of the ZKQ-PQ and TCI-R facets. A 5-factor solution was obtained, the second factor of which includes all four of the Sensation Seeking scales from the ZKA-PQ, two of the Aggression facet scales (AG1, physical aggression, AG2 verbal aggression), and two Novelty Seeking (NS 2 and 4) facets from the TCI-R. It also includes ZKA-PQ exhibitionism (EX3) and negative loadings from TCI-R self-acceptance (SD4) and fear of uncertainty (HA2) and a positive loading from impulsiveness (NS2). Although this is primarily a sensation seeking factor it is mixed with other kinds of facets ([Aluja, Blanch, García, García, & Escorial, 2012](#)).

The five factors of the original ZKPQ were well replicated, and the factor structure (principal axis plus varimax rotation) was shown to be highly congruent in the three samples despite cultural and age differences between the samples. Factor intercorrelations indicate a relative orthogonality among the five factors, with two exceptions. Specifically, significant correlations were found between Aggressiveness and Sensation Seeking, and between Neuroticism and Extraversion ([Aluja et al., 2010](#)).

Criterion/Predictive

The mean predictive capacity of the ZKA-PQ dimensions with regard to the 10 PD MCMI-III (Millon Clinical Multiaxial Inventory) scales was 33%. The use of the facets improved this with 37%; therefore, facets might provide a very slightly better descriptive capacity than the broader factors. The locally weighted scatterplot smoothing graphical analyses between the ZKA-PQ dimensions and the MCM-III PD scales showed that the personality dimensions predicted the three clusters from the II DSM-IV axis in a way very similar to that reported in the previous study with the ZKPQ by [Aluja, Rossier, and Zuckerman \(2007b\)](#). In both studies, this procedure is useful in ascertaining the relationships between the personality dimensions and the severity of the scores in the three PD clusters ([Aluja et al., 2012](#)).

Location

Aluja, A., Kuhlman, M., & Zuckerman, M. (2010). Development of the Zuckerman-Kuhlman-Aluja Personality Questionnaire (ZKA-PQ): A factor/facet version of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ). *Journal of Personality Assessment*, 92, 1–17.

Results and Comments

The ZKA-PQ is a new questionnaire based in the Zuckerman's five factor model. The five ZKA-PQ factors are similar to those from the ZKPQ, but are not totally equivalent because the new factors have been built from the facets. The results showed correlations between the ZKA-PQ and the NEO-PI-R/TCI-R (shortened versions) which were similar and in the predicted direction to those obtained using the original ZKPQ. However, there was a low correlation between AC and SD (0.16). Additionally, we obtained correlations between AG and NS (0.32), EX and N (– 0.29), SD (0.32) and Co (0.39), and NE and E (– 0.27). These correlations were also in the same direction of the previous findings, even though they were significant in the present study ([García et al., 2012](#)).

SENSATION SEEKING SCALE (IN ZKA-PQ)

Directions: A number of statements are shown below that describe some ways in which people act and think. Please indicate for each statement how much you agree or disagree. If you have not experienced that circumstance, please try to describe how you would act or what you think about that situation. If you Disagree Strongly write 1, If you Disagree Somewhat write 2, if you Agree Somewhat write 3, and if you Agree Strongly write 4. Be sure to indicate your agreement or disagreement for every statement.

1. Disagree Strongly, 2. Disagree Somewhat, 3. Agree Somewhat, 4. Agree Strongly

1. (2) [TAS] I enjoy the sensations of speeding in a car.
2. (7) [ES] I would like to take off on a trip with no pre-planned or definite routes or timetables.
3. (12) [Dis] I'll try anything once.
4. (17) [BS/Imp] I prefer friends who are excitingly unpredictable.
5. (22) [TAS] I like some physical activities that are somewhat risky.
6. (27) [ES] I enjoy getting into new situations where you can't predict how things will turn out.
7. (32) [Dis] I like 'wild' uninhibited parties.
8. (37) [BS/Imp] I get restless if I have to stay around home for any length of time.
9. (42) [TAS] I prefer fast-moving activities or sports.
10. (47) [ES] I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.
11. (52) [Dis] I like to let myself go and do impulsive things just for fun.
12. (57) [BS/Imp] I enjoy spending time in the familiar surroundings of my home or apartment.
13. (62) [TAS] I would like to learn to fly an airplane.
14. (67) [ES] I would like to travel to foreign lands where the people are quite different from the people in my own country.
15. (72) [Dis] I go to parties to meet exciting and stimulating people.
16. (77) [BS/Imp] I am polite and attentive to someone even if I do not find their conversation interesting.
17. (82) [TAS] I think I would enjoy being a fire-fighter.
18. (87) [ES] I like people who are unusual or different from most other people.
19. (92) [Dis] I do not try to restrain my urges to have exciting experiences.
20. (97) [BS/Imp] I have a reserved and cautious attitude toward life.
21. (102) [TAS] If I were in the Army I might volunteer for exciting but dangerous duties.
22. (107) [ES] I enjoy many types of loud, intense rock music.
23. (112) [Dis] I prefer quiet parties where one can have good conversation.
24. (117) [BS/Imp] My thinking is usually cautious and sensible.

25. (122) [TAS] I do not like to engage in sports or activities in which there is a significant risk of getting hurt.
26. (127) [ES] I would not like a job involving a lot of travel.
27. (132) [Dis] I am not interested in having new experiences just for the sake of experiencing new sensations.
28. (137) [BS/Imp] I don't like to start a project until I know exactly how to proceed.
29. (142) [TAS] I don't think I would like flying in a small airplane.
30. (147) [ES] I do not like people who behave in uncontrolled and unconventional ways.
31. (152) [Dis] I enjoy quiet, melodic popular or classical music.
32. (157) [BS/Imp] I tend to value and follow a rational and moderate approach to things.
33. (162) [TAS] Given a choice I would never volunteer for any activity that is physically risky.
34. (167) [ES] I am comfortable with the familiarity of a fixed daily routine.
35. (172) [Dis] One should not go too far in physical intimacy until one gets to know the other person.
36. (177) [BS/Imp] I usually make up my mind through careful reasoning.
37. (182) [TAS] I would never travel to other countries where there is unrest and the threat of violence.
38. (187) [ES] I would prefer to travel to places where people speak my language and have the same customs.
39. (192) [Dis] One of my goals in life is to experience intense and pleasurable sensations.
40. (197) [BS/Imp] Before I get into a new situation I like to find out what to expect from it.

Notes:

The items for the SSS are extracted from the ZKA-PQ (Aluja et al., 2010).

TAS = Thrill and Adventure Seeking; ES = Experience Seeking; Dis = Disinhibition;

BS/Imp = Boredom Susceptibility/Impulsivity.

Scoring:

Each non-reversed item is weighted 1 to 4 depending on the response. However reversed items, indicated by a star after the item number, are weighted in the reverse direction, i.e. 1 = 4, 2 = 3, 3 = 2, 4 = 1. The raw score for each subscale, TAS, ES, Dis, or BS/Imp, is the sum of the 10 weighted items for that subscale. A Total SSS score is the sum of the 4 subscales, or all 40 items.

TAS: items: 1, 5, 9, 13, 17, 21, 25*, 29*, 33*, 37*

ES items: 2, 6, 10, 14, 18, 22, 26*, 30*, 34*, 38*

Dis items: 3, 7, 11, 15, 19, 23*, 27*, 31*, 35*, 39

BS/Imp items: 4, 8, 12*, 16*, 20*, 24*, 28*, 32*, 36*, 40*

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OTHER SENSATION SEEKING SCALES

Novelty Seeking Scale (NSS) – (from TCI-R)

(Cloninger et al., 1999).

Variable

The NSS which measures novelty seeking tendencies, is a subscale of the Temperament and Character Inventory Revised (TCI-R) (Cloninger et al., 1999).

Description

The TCI-R developed by Cloninger et al. (1999), is a revised version of the TCI (Cloninger, Przybeck, Svrakic, & Wetzel, 1994) used as a measure for their biosocial personality model based on four temperaments (Novelty Seeking [NS], Harm Avoidance [HA], Reward Dependence [RD], and Persistence [PS]) and three character traits (Self-directedness [SD], Cooperativeness [CO], and Self-transcendence [ST]). In this latter form, a 5-point Likert response format was incorporated, and the PS short scales was converted into a dimension with an additional new subscale for RD (RD2). Both versions had 240-items but the TCI-R preserved 189 of the original TCI items. Overall, 37-items were also eliminated, and 51-new items were incorporated, including 5 validity items. The factorial structure of the TCI-R was robust and similar to the TCI, with acceptable facet reliability.

Cloninger, Svrakic, and Przybeck (1993) constructed a set of scales based on a biological model for personality. One of these is called Novelty Seeking (NS). Factor analysis was not used in the development of these scales. Four rationally derived facets describe the NS factor: The Temperament facets for Novelty Seeking (NS) are: Exploratory excitability (NS1), Impulsiveness (NS2), Extravagance (NS3) and Disorderliness (NS4) (60 items). The content resembles that of the ImpSS of the ZKPQ. It is therefore not surprising that NS and ImpSS correlate highly (0.68) (Zuckerman & Cloninger, 1996). Although the TCI as a whole suffers from psychometric problems in factor validity it has been widely used in the psychiatric, genetic, and psychobiological literature. NS and ImpSS correlate highly. NS in particular has been linked to a dopamine receptor gene (Ebstein et al., 1996). In recent years, the TCI-R has been adapted to several languages and cross-cultural contexts with clinical and non-clinical samples.

Sample

A recent Spanish validation of the TCI-R was carried out by Aluja et al. (2010). Participants were 928 voluntary students and friends and relatives (396 males and 532 women). The 195 students constituted 27% of the total sample. The average age was 30.69 years ($SD = 11.62$; range: 18–77 years), for males 31.28 years ($SD = 11.84$; range: 18–77 years) and for females 30.11 years ($SD = 11.32$; range 18–75 years).

Reliability

Internal Consistency

Cronbach alpha coefficients for the subscales/facets varied between 0.63 and 0.85 (García et al., 2012). Alpha coefficients for the Novelty Seeking facets ranged from 0.45 to 0.67. The total NS alpha coefficient was 0.63 (García et al., 2012).

Test–Retest

Hansenne et al. (2005) assessed the test–retest reliabilities using the two-way random effects model intraclass correlation coefficient (ICC). The coefficients for the dimensions were derived from all the individual items (i.e., all NS items and not NS1, NS2, NS3, NS4 as items). Test–retest reliabilities were calculated at two weeks and at 6 months. All ICCs were statistically significant. At two weeks, ICCs ranged from 0.81 to 0.89 and at 6 weeks from 0.53 to 0.65.

Validity

Convergent/Concurrent

In the Aluja and Blanch (2011) study, positive correlations were found between TCI-R Novelty Seeking and ImpSS (0.50), Agg-Host (0.23), Sy (0.29) of the ZKPQ-50-CC and NEO-FFI-R Extraversion (0.30), and Openness (0.20).

Divergent/Discriminant

Negative correlations were found between Novelty Seeking and Agreeableness ($-.24$), and with Conscientiousness ($-.39$) (Aluja & Blanch, 2011).

Construct/Factor Analytic

TCI-R principal components analyses were conducted with promax oblique rotation in a two step procedure: (a) using the 16 facets of Temperament; and (b) using the three Character dimensions. Four Temperament factors were extracted in accordance with the 'eigenvalue greater than one' criteria, explaining 61.61% of the total variance (F-I: 23.47%; F-II: 16.05%; F-III: 14.54%; F-IV: 7.55%). The same procedure was replicated for the age groups with similar results. Total congruence coefficients ranged between 0.76 and 1 for facets, and 0.92 and 0.95 for factorial matrices. Besides, PCA analyses with the Character facets were performed for the full sample and age groups with Promax rotations and 'eigenvalue one' criteria. We extracted three factors that accounted to 59.88% of the total variance (F-I: 32.07%; F-II: 16.84%; F-III: 10.97%) (Aluja et al., 2010).

A principal components analysis with varimax rotation was performed on the intercorrelations of the TCI-R, NEO-FFI-R (O: Openness, C: Conscientiousness, E: Extraversion, A: Agreeableness and N: Neuroticism) and ZKPQ-50-CC scales. A 5-component solution with total variance of 72% was derived (Aluja et al., 2011). The first component (Aggression/Agreeableness) largely consisted of A, CO and Agg-Host, with secondary loadings on C, NS, ImpSS, SD, and RD from the other factors. The second component (Neuroticism) was constituted by N, N-Anx, and HA, with a secondary loading on SD. The third component (Extraversion) was primarily defined by Sy, E, and RD with secondary loadings on ImpSS and NS. The fourth component (Persistence/Activity/Conscientiousness) was defined by PS, Act, and C. whereas the fifth component (Openness/Self-Transcendence) consisted of O and ST (Aluja et al., 2011). Using Spanish samples, Aluja and Blanch (2011) carried out a principal components analysis with varimax rotation of the TCI-R, ZKPQ-50-CC and NEO-FFI-R in a Spanish sample of 928 voluntary university students. The first component included Sy, Extraversion E, RD, ImpSS and NS showing good convergent validity for Novelty Seeking scales and ImpSS scales but a lack of discriminant validity between them and extraversion scales.

Criterion/Predictive

Novelty Seeking was significantly predictive of frequency of drinking and problem drinking (Galen, Henderson, & Whitman, 1997).

Location

Aluja, A. & Blanch, A. (2011). The five and seven factor personality models: Differences and similitudes between the TCI-R, NEO-FFI-R and ZKPQ-50-CC. *Spanish Journal of Psychology*, 14, 659–666.

Cloninger C.R., Svrakic D.M., Bayón, C., & Przybeck T.R. (1999). Measurement of psychopathology as variants of personality. In C.R. Cloninger, D.M. Svrakic, C. Bayón, & T.R. Przybeck (Eds.), *Personality and psychopathology*. Washington, DC: American Psychiatric Press.

Hansenne, M., Delhez, M., & Cloninger, C.R. (2005). Psychometric properties of the Temperament and Character Inventory-Revised (TCI-R) in a Belgian sample. *Journal of Personality Assessment*, 85, 40–49.

Results and Comments

Novelty Seeking test scores in a group of 124 unrelated Israeli subjects are significantly associated with a particular exon polymorphism, the 7-repeat allele in the locus for the D4 dopamine receptor gene (D4DR) although replications are not consistently successful. The association of high Novelty Seeking and the 7-repeat allele was independent of ethnicity, sex or age of the subjects (Ebstein et al., 1996).

NSS SAMPLE ITEMS

Directions: In this questionnaire you will find statements that people might use to describe their attitudes, opinions, interests and other personal feelings. For each of the following questions, please circle the number

that best describes the way you usually or generally act or feel.

1 = Definitely false. 2 = Most or probably false.
3 = Neither true nor false, or about equally true

and false. 4 = Most or probably true. 5 = Definitely true.

Examples:

1. I often try new things for fun or thrills even if most people feel it is a waste of time (Exploratory Excitability)
10. I often do things based on how I feel at the moment without thinking about how they were done in the past (Impulsiveness)
14. I am more reserved and controlled than most people (Extravagance)

44. I like it when people can do whatever they want without strict rules and regulations (Disorderliness)

Scoring keys:

- NS1 (10 items) = 1.
 NS2 (9 items) = 10.
 NS3 (9 items) = 14 (inverse).
 NS4 (7 items) = 44.
 NS = NS1 + NS2 + NS3 + NS4.

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Arnett Inventory of Sensation Seeking (AISS)

(Arnett, 1994).

Variable

The AISS measures sensation seeking tendencies.

Description

The last definition of sensation seeking includes both intensity and novelty as qualities of stimulation that were particularly rewarding for high sensation seekers (e.g., Zuckerman, 1994). The AISS was designed to assess the personality trait of sensation seeking, which is presumed to contribute to risk preferences. Sensation seeking is defined as a need for novel and intense stimulation. Arnett (1994) attempted to incorporate these two qualities in separate subscales for his SS scale. He deliberately avoided items with content involving 'illegal or norm-breaking behavior' like those in the SSS-V (but eliminated in the ZKPQ and in its subsequent forms). The Arnett Inventory of Sensation Seeking (Arnett, 1994) is a 20-item self-report measure of sensation seeking based on a conceptualization of sensation seeking that includes two dimensions: need for intense stimulation and need for novel stimulation.

Sample

Arnett (1994) used several samples: The first sample consisted of 116 adolescents aged 16–18 years (54 boys and 62 girls), the second sample consisted of 139 adolescents aged 16–18 years (67 boys and 72 girls), and the third sample comprised 38 adults aged 41–59 years.

Reliability

Internal Consistency

The Cronbach alpha coefficient was 0.70 for the total scale, 0.64 for the Intensity subscale, and 0.50 for the Novelty subscale (Arnett, 1994). Roth (2003) in Germany reported lower alpha coefficients: 0.61 for the Total score, 0.53 for Intensity and 0.52 for Novelty. In a recent study by Smorti and Guarnieri (2013) in Italy, alpha coefficients ranged from 0.56 to 0.71.

Test–Retest

The three month test–retest stability coefficients exceeded 0.80 (Arnett, 1994).

Validity

Convergent/Concurrent

AISS scales correlated with total SSS-V scales 0.35 (intensity), 0.33 (Novelty) and AISS total score (0.41). However among the subscale correlations of the two tests SSS-Disinhibition correlated only with AISS Intensity (0.41) and SSS-Experience Seeking correlated only with AISS Novelty. It appears that the distinction between

novelty and intensity seeking exists in the SSS under different scale names: Dis for intensity and ES for novelty.

Divergent/Discriminant

Smorti and Guarnieri (2013) analyzed the discriminative validity of AISS scales by assessing the differences between males and females via univariate analyses of variance (ANOVAs), with gender as a fixed factor. A sample of adolescent males showed significantly higher scores on the Novelty scale than did adolescent females, $M = 16.25$, $SD = 2.99$ vs. $M = 15.22$, $SD = 3.23$, respectively [$F(1347) = 9.32$, $p < .005$; $\eta^2 = .03$]. Adolescent males also exhibited significantly higher on the Intensity scale than did adolescent females, $M = 28.18$, $SD = 4.12$ vs. $M = 23.94$, $SD = 4.08$, respectively [$F(1347) = 107.93$, $p < .001$; $\eta^2 = .24$]. Males showed significantly higher scores on AISS total score than did females, $M = 44.83$, $SD = 5.57$ vs. $M = 39.17$, $SD = 5.51$, respectively [$F(1347) = 88.20$, $p < 0.001$; $\eta^2 = 0.20$].

Construct/Factor Analytic

The EQS 6.1 confirmatory factor analysis carried out by Smorti and Guarnieri (2013) revealed an unsatisfactory goodness-of-fit for the full 20-item AISS (CFI = 71, and SRMSR = 0.07), but the scale of 17 items obtained satisfactory values (CFI = 91, and SRMSR = 0.05).

Criterion/Predictive

The AISS total score correlated significantly with risky behaviors including: driving while intoxicated (0.24), sex with someone not known well known (0.30), and vandalism (0.33) (Arnett, 1994).

Location

Arnett, J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality and Individual Differences*, 16, 289–296.

Results and Comments

The AISS represents a new conceptualization of sensation seeking focused on high sensation seekers' need for stimulation novelty and intensity that is useful for exploring its link with different types of risky behaviors. Although this scale contains no items on risky behaviors, the AISS subscales were associated with risky driving and alcohol use.

AISS SAMPLE ITEMS

Directions: For each item, indicate which response best applies to you:

20 items using 4-point scales (1 = describes me very well to 4 = does not describe me at all)

Two sub-scales: Novelty (1) and Intensity (2). Examples:

1. I can see how it would be interesting to marry someone from a foreign country. (Novelty)
2. When I listen to music, I like it to be loud. (Intensity)

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Brief Sensation Seeking Scale (BSSS)

(Hoyle et al., 2002).

Variable

The BSSS measures sensation seeking tendencies.

Description

The need for a brief SSS representing all four SSS facets led Hoyle et al. (2002) to devise an 8-item BSSS with two items for each facet. They avoided items with alcohol or drug content. The facets are not scored but a Total SSS is used with a 5-point Likert-type response format for the items. The Brief Sensation Seeking Scale was created by adapting items from the SSS-V (Zuckerman, 1994) and a set of items derived from the SSS-V but tailored

for adolescents. In the final version of the BSSS, each of the four primary dimensions of sensation seeking is represented by two items. Responses are indicated on five-point scales labeled, 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree', and 'strongly agree'. For research purposes, the scale was titled 'Interest and Preference Survey'.

Sample

Students at a middle school and a high school were invited to participate in a survey of interests and preferences. From among 1692 students on the roll, a total of 1302 students (77%) completed the survey in the first study. In the second study participants were 6368 adolescents in grades seven through 12 recruited by telephone from class rolls in two metropolitan areas in the south-eastern United States (Hoyle et al., 2002).

Reliability

Internal Consistency

Cronbach alpha coefficients ranged from 0.74 to 0.79 for various ethnic groups. Coefficient alpha for four of the six groups ranged from 0.74 and 0.79. The alpha coefficient for African-American males was 0.68 (Hoyle et al., 2002).

Test–Retest

Test–retest reliability in a sample of children (aged 7–12 years) was found to be 0.71 (Jensen, Weaver, Ivic, & Imboden, 2011).

Convergent/Concurrent

Using the full sample, BSSS scores correlated with risk factors as follows: Deviance (0.34), Perceived peer use of marijuana (0.40), Perceived family use of marijuana (0.22), and Perceived community use of marijuana (0.23).

Divergent/Discriminant

Correlations with protective factors were: Absence of depression -0.20 , Self-acceptance -0.18 , Quality of home life (-0.29) , Law abidance (-0.41) , Religiosity (-0.24) , and Perceived sanctions against marijuana use (-0.39) .

Construct/Factor Analytic

Using a confirmatory factor analysis, a single-factor model was specified. Estimation of the single-factor model produced promising values for the indexes of fit. All loadings were statistically significant, ranging from 0.32 for item 2, to 0.62 for items 6 and 8 (Hoyle et al., 2002).

Criterion/Predictive

BSSS scores correlated as expected with an array of drug-related outcomes as well as risk and protective factors for problem behaviors. For example, the BSSS predicted tobacco, alcohol and drug use and attitudes toward these substances in all ethnic groups (Hoyle et al., 2002). Correlations between BSSS scores and responses to drug-related items in the full sample were: tobacco (0.36), alcohol (0.36) marijuana (0.35), inhalants (0.22), hallucinogens (0.29) and cocaine/crack (0.17).

Location

Hoyle, R.H., Stephenson, M.T., Palmgreen, P., Lorch, E.P., & Donohew, R.L. (2002) Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences*, 32, 401–414.

Results and Comments

The authors asserted that the BSSS is a viable measure of sensation seeking for adolescents and young adults. Internal consistency of the scale is sufficient to conclude that items are good indicators of the sensation seeking construct. Wisely, the authors did not attempt to construct subscales for the four factors based on only two items for each. The total 8 item scale is sufficiently reliable to show the effects of media anti-drug messages in large populations of adolescents (e.g., Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001).

BRIEF SENSATION SEEKING SCALE

Response Categories:

1. Strongly disagree
2. Disagree
3. Neither disagree nor agree
4. Agree
5. Strongly agree

Experience seeking

1. I would like to explore strange places.

Boredom susceptibility

2. I get restless when I spend too much time at home.

Thrill and adventure seeking

3. I like to do frightening things.

Disinhibition

4. I like wild parties.

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FUTURE RESEARCH DIRECTIONS

From an *ad hoc* scale developed to predict responses to sensory deprivation, the search for validity has broadened the vision of the sensation seeking construct to a basic personality trait with its roots in evolution, genetics, and biology. The SSS has been developed in two directions: one a general SS scale combined with a closely associated trait, impulsivity (ImpSS in the ZKPQ); the other, a content improved version of the original four basic content factors (SS in the ZKA-PQ). The items of the current version of the SSS scales included in the ZKA-PQ have been revised, taking into account specific behaviors such as the use of alcohol, drugs or other specific behaviors that could enhance the predictive power of the scales.

If durability is a test of the utility of a construct and its associated assessment tools, then sensation seeking has proven its survival value. After 50 years it continues to remain of central interest in many fields of psychology. Although it remains a minor facet of extraversion in the Big Five, the genetic and biological findings support the contention that sensation seeking is a basic personality trait.

In future research, the sensation seeking psychobiological model can be incorporated into the study of molecular genetics (Aluja et al., 2011), brain system techniques (DeYoung, 2010), neuronal biochemistry, MRI (Ryman et al., 2011), or electrophysiology (Carolan, Jaspers-Fayer, Asmaro, Douglas, & Liotti, 2014). Research using functional magnetic resonance imaging (fMRI) in humans is moving brain studies into sensation seeking from lower animals back to humans.

Using the new SSS scales included in the ZKA-PQ, it can be seen that individuals having a lack of inhibitory control show high levels of impulsivity and aggressiveness, and also lower serotonergic activity. Disinhibition syndromes defined as a disruption of active inhibitory processes regulating tendencies to respond, refer to human behavior interpreted as arising from lessened controls on response inclinations. Disinhibited individuals appear unable to control their immediate response inclinations as a means of achieving long-term goals. Among the behavioral traits and forms of psychopathology characterized primarily by disinhibition are risky sexuality, impulsiveness, aggressiveness, antisocial and borderline behavior, as well as alcohol and drug abuse. These behavioral traits are highly related to sensation seeking. In the near future, it is expected that psychobiological research in molecular genetics and functional brain imaging will contribute to a better understanding of the biological bases of personality, including sensation seeking.

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